

## Neuro Optometric Rehabilitation: An Emerging Specialty

It is very fitting that this focus group on Neuro Optometry is presented at this meeting in this particular venue. Thirty seven years ago I met and listened to Dr. William Ludlam present a three day seminar here in San Diego. It was also thirty seven years ago I attended my first American Academy of Optometry meeting in Los Angeles.

As coordinator of the seminar Bill was addressing (San Diego Behavioral Vision Seminar) in October of 1968 I was concerned when I called to confirm his arrival at the hotel. He had not checked in at 6:30 in the evening although I had his flight schedule and knew he had arrived at 3:00 that afternoon. I followed up with another call to the hotel and still he had not checked in at 9:00, nor at midnight. I finally went to bed at midnight assuming I was going to have to face an audience of 40 people and explain to them that the only speaker for the ensuing three days was not here. Calling the hotel about 6:30 the next morning I was relieved to find he was indeed present. Two months later I attended my first American Academy of Optometry meeting in Los Angeles and 4 months after that I married the man and the profession. Although the man is no longer physically with us the love endures and my passion for the profession continues.

The interesting thing about this little story is that Bill had arrived the previous afternoon but had gone directly to the Naval Electronics Laboratory of Carol White and Russell Harter. They had stumbled on a very interesting phenomena while exploring the possibility of monitoring brain waves as a feedback mechanism to track the visual attention of Submariners watching instruments for extended periods of time. What they were seeing was a unique A-B waveform emerging with repeated visual stimulation. It was time locked with regard to the stimulus and therefore able to be seen as it summed, emerging from the random neural activity produced in visual cortex. They considered this information interesting but not what they were seeking.

Bill saw an immediate way into the visual processing system and we began designing, researching and refining this new methodology. Some of you in this room will remember me wearing electrodes taped to my head, ear clips on each ear and all the leads taped to the shoulder of my white Optometric Center of NY lab coat as we were taking measurements for the Myopia study and developing protocols for Visual Evoked Response simultaneously. Bill saw the possibility for this to be used as an instrument for measuring the potential for visual acuity, binocularity, and visual processing in individuals who were unable to respond to traditional optometric testing due to injury, stroke, inability to speak, etc. Bill also saw this instrument as a way of testing infant vision. One of the first babies to be evaluated by this means was Dr. Mike Hieberger's 3 week old son. It was a heady time to be in Optometry. The first hand held ultrasound probe was developed by Bill and Dr. Ernie Giglio, the Optometric Center of NY was in the process of moving into the new building on 23<sup>rd</sup> street and the seeds of SUNY college of Optometry were sown from the ashes of the Optometric program at Columbia University.

Now evoked potential evaluation is the gold standard for early detection of MS, validating head injury, the last word in injury cases that are being adjudicated and is constantly being refined and expanded to investigate the process of visual information acquisition, integration and emergent attention factors among many.

Optometry's role in probing the neurology supporting the entire visual process is long. The first observable electrical potential was identified by a researcher named Berger and bore his name for some time. We now call that the alpha rhythm. W. Grey Walter, while not an optometrist, recognized the Berger (Alpha) Rhythm in \_\_\_\_\_ and began watching changes in that largest and only visible ongoing brain-wave. He noted that there were differences in amplitude and bundling when certain individuals closed their eyes and when their eyes were open. He observed that some patients had large amplitude ongoing waveforms regardless of eyes open or eyes closed. He further noted that in some individuals the amplitude of this

waveform was very small, almost non-existent and did not alter. The largest group in the population he observed showed a very clear difference between the amplitude when eyes were open as opposed to eyes closed. He labeled these groups Alpha persistent, Alpha minus and Alpha responsive. HE further extrapolated behavior types to these groups and went so far as to recommend this test be administered before marriage was considered. He felt the wedding of an Alpha persistent to an Alpha minus individual was doomed to failure due to the huge difference in behavioral styles.

Neuro-Optometry today is a merging of the skills developed and tools acquired over the past \_\_\_\_\_ years. The concept that lens application could shape visual development and act in a therapeutic fashion rather than a solely compensatory role moved the profession forward. The exploration of lenses, prisms and therapeutic regimens to assist those with low vision was another giant leap forward. Contact lenses contributed more tools and were added to the means of improving vision and visual process. They were used not only to compensate for refractive error but to manipulate refractive state, damp nystagmus, and slow progression of myopia in some cases. The science of lens application and pursuit of new materials is ever changing and expanding.

The synthesis of all these areas of Optometry is emerging in Neuro-Optometry. In our society today individuals are surviving catastrophic accidents and injuries, babies are surviving delivery at 23 weeks gestation, the prevalence of progressive neurological disorders is increasing, people are surviving stroke and brain tumors. And ALL these individuals have visual disorders of some degree. There are more subtle presentations of head trauma wherein nothing can be shown on MRI, tomography, etc. but severe symptoms of dizziness, headache, disorientation, nausea have robbed them of their lives. This is the population served by this newest Optometric Specialty. It necessitates the best lens applications, the best knowledge of low vision procedures, the best interpretation of field evaluation, of electrodiagnostic testing and the integration of these skills with the allied professions serving these patients.

As Bill was struggling in an attempt to recover from damaging surgical procedures to reduce the invasiveness of a huge benign hemangioma he was directing lens application to stabilize his fragmented visual world. Although speech was very difficult we worked together to address the changes in his perceived visual midline, to allow him access to a lost field, to compensate for a palid optic nerve, to use vision to facilitate a hand and arm that no longer responded. His intellect was intact, trapped in a body that could no longer respond yet he was exploring and problem solving using the tools of the profession he loved. He was practicing Neuro-Optometry.

The next 1 ½ hours will be spent in an overview of this specialty. Dr. William Padula and Dr. Vincent Vicci were not only respected colleagues of Bill's but friends and fellow visionaries. They are pioneers in this emerging field, widely published constantly presenting to Optometric groups as well as allied professions.

I thank the Academy for making this focus session possible and consider it a special honor to turn the remainder of this program over to Drs. Padula and Vicci.